View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Elsevier - Publisher Connector

patients (mean age 65 years, mean Deyo-Charlson Comorbidity Index 0.6, mean hospital length of stay 6.35 days); 214 cases and 214 controls were randomly selected from the cohort for chart data analysis. In the 12 months post-index arthroplasty, there were 830 (2.5%) patients who had SSI, 644 (1.9%) who had SSB, and 84 (0.3%) who developed VTE. Of all SSI events, 65% occurred by 90 days following arthroplasty. Significantly more patients who had received post-discharge thromboprophylaxis versus those that did not developed SSI but not SSB (SSI: 28.4% vs 23.2% [P<0.0001]; SSB:28.5% vs 23.3% [P=0.07]). In the logistic regression analysis, only the duration of surgery (P=0.004), surgical revision (P=0.04), and rehospitalization (P<0.001) emerged as independent predictors of SSI. **CONCLUSIONS:** Post-discharge thromboprophylaxis and SSB were not associated with post-operative SSI, thus dispelling concerns about the increased risk of developing SSI due to prolonged SSB associated with the use of pharmacologic thromboprophylaxis. Additional studies are needed to endorse these findings in similar patient populations.

PCV4

THROMBOPROPHYLAXIS AND THE RISK OF POST-DISCHARGE VENOUS THROMBOEMBOLISM AND BLEEDING IN PATIENTS UNDERGOING TOTAL HIP OR KNEE ARTHROPLASTY

Huo MH[1], Spencer DL[2], Fan Y[2], Borah BJ[3], Mills RM[4], Klaskala W[4]
[1]University of Texas Southwestern Medical Center, Dallas, TX, USA, [2]OptumInsight, Life Sciences, Eden Prairie, MN, USA, [3]Division of Health Care Policy and Research, Mayo Clinic, Rochester, MN, USA, [4]Janssen Research & Development, LLC, Raritan, NJ, USA

OBJECTIVES: The risk of post-discharge venous thromboembolism (VTE) and bleeding in total knee and hip arthroplasty (TKA/THA) has not been completely elucidated because interventions to reduce these adverse outcomes have evolved rapidly. The objective of this study was to determine the incidence of these events and associated risk factors, and to evaluate the use of thromboprophylaxis. **METHODS:** Administrative medical records (2004–2009) from a large healthcare plan were linked to an inpatient database of 450 hospitals in the United States. Adult patients undergoing TKA or THA with no evidence of prior orthopaedic surgeries, prior VTE, post-discharge revision surgeries, or death were included. ICD-9-CM diagnosis and CPT/HCPC procedure codes were used for evaluating symptomatic VTE and bleeding rates 90 days post-surgery. Multivariate analyses were performed to identify predictors of VTE and bleeding after hospitalization. **RESULTS:** Two hundred twenty-six of 9167 patients (2.5%; 3109 THA, 6058 TKA) with a median age of 60 years and a mean Charlson-Quan comorbidity index score of 0.5 experienced VTE, and 324 (3.5%) had bleeding. Most of these events occurred post-discharge (70% and 79%, respectively). Over 50% of VTE occurred within 30 days post-discharge. Consistent predictors of VTE and bleeding after hospitalization were inpatient VTE or bleeding, respectively, and all-cause rehospitalization. Post-discharge thromboprophylaxis was not a significant risk factor for bleeding. Ninety-eight percent of patients received thromboprophylaxis during hospitalization; 26% received it post-discharge. During hospitalization, three-fourths of patients received enoxaparin and/or warfarin, often in combination with mechanical prophylaxis devices (57%). Post-discharge, mean antithrombotic drug exposure was 7.4 days. **CONCLUSIONS:** Patients who experience VTE or bleeding during hospitalization and patients who are rehospitalized are at greatest risk of thromboembolic and bleeding outcomes, respectively, post-discharge. These data also suggest that the use of thromboprophylaxis following hospitalization should not significantly increase the risk of post-discharge bleeding after TKA/THA.

PCV5

INTRA-ARTERIAL THROMBOLYSIS VERSUS STANDARD TREATMENT OR INTRAVENOUS THROMBOLYSIS IN ADULTS WITH ACUTE ISCHEMIC STROKE: A SYSTEMATIC REVIEW AND META-ANALYSIS

Nam J, He J, O'Reilly D
PATH Research Institute, McMaster University, Hamilton, ON, Canada

OBJECTIVES: Recent evidence has suggested that intra-arterial thrombolysis (IAT) may provide benefit beyond intravenous thrombolysis (IVT) in ischemic stroke patients. Previous meta-analyses have only compared IAT to standard treatment [without thrombolysis]. The objective was to review the benefits and harms of IAT in ischemic stroke patients. **METHODS:** EMBASE, MEDLINE, the Cochrane registry and the stroke trials registry were queried from inception to 2011. Two reviewers independently screened titles and abstracts for randomized controlled trials of ischemic stroke comparing IAT to either IVT or standard treatment. Primary outcomes included good functional outcome, excellent functional outcome, mortality and symptomatic intracranial hemorrhage. Results were stratified by comparison treatment. **RESULTS:** A total of 543 citations were identified. Two trials (n=81) compared IAT to IVT while the remaining four trials (n=351) compared IAT to standard treatment. IAT increased good functional outcome by 47% when compared to standard treatment (RR=1.47; 95%CI=1.07-2.22; I^2=0) and 74% when compared to IVT (RR=1.74; 95%CI=1.01-3.01; I^2=0). Excellent functional outcome was 73% higher with IAT when compared to standard treatment (RR=1.73; 95%CI=1.17-2.57; I^2=0) and not significantly different when compared to IVT (RR=1.74; 95%CI=0.85-3.56), though only one trial reported results for the latter. IAT did not increase mortality when compared to standard treatment (RR=0.82; 95%CI=0.56–1.21; I^2=0) or IVT (RR=1.12; 95%CI=0.47–2.68; I^2=0). Syptomatic intracranial hemorrhage, however, was almost 4 times higher with IAT when compared to standard treatment (RR=3.90; 95%CI=1.41–10.76; I^2=0) while not significantly different when compared to IVT (RR=1.13; 95%CI=0.32–3.99; I^2=42%). **CONCLUSIONS:** Compared to standard treatment, IAT increases good and excellent functional outcomes; compared to IVT, IAT increases good functional outcome. As well, IAT does not increase mortality over IVT or standard treatment. However, IAT increases symptomatic intracranial hemorrhage compared to standard treatment while the risk remains comparable to IVT. Imprecise pooled estimates for good and excellent functional outcome prevent any overtly strong recommendation for the use of IAT.

PCV6

RISK OF ADVERSE CARDIOVASCULAR OUTCOMES ASSOCIATED WITH CONCOMITANT USE OF CLOPIDOGREL AND PROTON PUMP INHIBITORS IN ELDERLY MEDICARE BENEFICIARIES

Mahabaleshwarkar R, Yang Y, Datar M, Bentley JP, Strum M, Banahan BFI, Null KD
University of Mississippi, University, MS, USA

OBJECTIVES: Evidence regarding the effect of concomitant use of clopidogrel and proton pump inhibitors (PPIs) on adverse cardiovascular outcomes remains inconclusive. The purpose of the current study was to examine the effect of concomitant use of clopidogrel and PPI in a national sample of elderly Medicare beneficiaries (age ≥ 65 years). **METHODS:** The study used a nested case-control design. A cohort of Medicare beneficiaries taking clopidogrel for any period between July 1, 2006 and December 31, 2008 was identified from a 5% national sample of Medicare claims data using prescription records. Beneficiaries who had a gap of more than 30 days between clopidogrel fills were excluded. Within the continuous clopidogrel user cohort, cases [beneficiaries who experienced a major adverse cardiovascular event (MACE, composite of acute myocardial infarction, coronary artery bypass graft, percutaneous coronary intervention, stroke, and mortality)] and controls (beneficiaries who did not experience a MACE) were identified from inpatient and outpatient claims. Concomitant use of clopidogrel and PPI was ascertained using prescription drug records. Each case was matched to a control on age and time to start clopilogrel using a greedy match algorithm. Conditional logistic regression was conducted on the matched sample to evaluate the association between concomitant use and occurrence of a MACE. **RESULTS:** A cohort of 43,159 clopidogrel users was identified. 15,722 of them (36.4%) used clopidogrel and PPI concomitantly at any time during the study period. 9,332 cases were identified and matched to equal number of controls. Beneficiaries using clopidogrel and PPI concomitantly were more likely to experience a MACE as compared to beneficiaries receiving clopidogrel only (odds ratio: 1.411, 95% Confidence Interval: 1.322 – 1.506). **CONCLUSIONS:** Concomitant use of clopidogrel and PPI was associated with an increased risk of experiencing a cardiovascular adverse event. Caution should be exercised when co-prescribing the two medications to elderly patients.

PCV7

IMPACT OF COMORBIDITIES ON RISK OF CARDIOVASCULAR HOSPITALIZATION AMONG PATIENTS WITH AND WITHOUT ATRIAL FIBRILLATION

Panaccio M[1], Cummins G[2], Miao R[1], Davis P[1], Wentworth C[3], Lanes S[3], Reynolds M[3], Michels S[3], Koren A[1]
[1]Sanofi-Aventis, Bridgewater, NJ, USA, [2]Quintiles Global Consulting, Hawthorne, NY, USA, [3]United BioSource Corporation, Lexington, MA, USA

OBJECTIVES: To quantify the impact of atrial fibrillation (AF) and major AF comorbidities on risk of cardiovascular (CV) hospitalization (CVH). **METHODS:** This retrospective cohort study assessed an administrative claims database (Thomson Reuters' MarketScan) for newly diagnosed AF patients and demographically matched non-AF patients to characterize risk of comorbidities and CVH among AF patients. Patients aged ≥40 years with >364 days in the database were identified by a qualifying AF diagnosis (≥2 outpatient diagnoses within 30 days of each other or ≥1 inpatient diagnosis) from January 1, 2004 to June 29, 2009. **RESULTS:** A total of 210,524 patients were included (mean age 74.0±12.5 years, 49% male, 68% Medicare). Compared with non-AF patients, AF patients were more likely prescribed beta blockers (44% vs. 22%), digoxin (15% vs. 2%), and anticoagulants (29% vs. 2%); had a higher severity of illness (Charlson Comorbidity Index score ≥4; 16.5% vs. 4.1%); and had higher comorbidity prevalence (odds ratio; 95% confidence interval): myocardial infarction (13.1; 11.7-14.7), heart failure (HF; 9.2; 8.9-9.6), and pulmonary embolism (8.2; 7.2-9.5). Risk of new CV events and comorbidities at follow-up was significantly (P<0.0001) higher in AF patients, most notably major bleeding, HF, valvular disease, and stroke. AF patients with baseline comorbidities related to CHADS2 (score ≥2) or CHA2DS2-VASc (score ≥4) experienced ≥2.5-fold higher rates of overall CVH. AF patients had 3.4-fold higher CVH risk with ~30% hospitalized at 1 year vs. 8% of non-AF patients; 24.3% of AF patients experienced recurrent AF requiring hospitalization (incidence: 176/1000 person-years). **CONCLUSIONS:** AF patients have higher burden of baseline CV comorbidities that portend greater risk of CVH and new CV comorbidities following diagnosis compared to matched non-AF patients. These data indicate AF recurrence requiring hospitalization and overall hospitalizations 1 year following diagnosis is common.

PCV8

IMPCT OF COMORBIDITIES ON TIME IN THERAPEUTIC RANGE IN PATIENTS WITH NONVALVULAR ATRIAL FIBRILLATION

Choi JC[1], Damaraju C[2], Mills RM[2], Wildgoose P[3], Fields L[3], Schein J[1], Nelson WW[1]
[1]Janssen Scientific Affairs, LLC, Raritan, NJ, USA, [2]Janssen Research & Development, LLC, Raritan, NJ, USA, [3]Janssen Pharmaceuticals, Inc., Raritan, NJ, USA

OBJECTIVES: Time in therapeutic range (TTR) may be a quality indicator for anticoagulation. Previous studies have demonstrated that heart failure (HF) and other comorbidities are associated with poorer anticoagulation control; however, this association was not studied in a representative US population. The objective was to determine the association between HF, other comorbidities, patient characteristics, and TTR among patients with nonvalvular atrial fibrillation (NVAF). **METHODS:** We analyzed longitudinal patient-level anticoagulation management records collected between 2006 and 2010 by decision support software, CoagClinic™. Adult patients with NVAF who used warfarin over 12 months with no gap >60 days between visits were identified. The Rosendaal method was used to cal-

culate TTR, and TTR <55% was defined as "lower TTR". $CHADS_2 \geq 2$ was defined as "higher $CHADS_2$". Logistic regression analyses were conducted to determine the association between comorbidities and TTR. **RESULTS:** We identified 23,425 patients. The mean (±SD) age was 74.8±9.7 years, with 84.8% ≥65 years. The most common comorbidities were hypertension (41.7%), diabetes (24.1%), HF (11.7%), and stroke (11.1%). The mean (±SD) TTR was 67.3±14.4; 18.7% of patients had "lower TTR". In multivariable analyses, using age, gender, hypertension, diabetes, stroke, and region as covariates, HF was associated with "lower TTR" [adjusted OR (95%CI) = 1.41 (1.28, 1.56); p<.001]. Diabetes [1.28 (1.19, 1.38); p<.001], and stroke [1.15 (1.04, 1.27); p<.001] were also associated with "lower TTR". In the second multivariable analyses, using gender, and region as covariates, "higher $CHADS_2$" was associated with "lower TTR" [adjusted OR (95%CI) = 1.11 (1.04, 1.18); p<.001]. **CONCLUSIONS:** Common comorbidities that accompany NVAF are associated with "lower TTR". HF was associated with the greatest likelihood of a "lower TTR", followed by diabetes, then stroke. Anticoagulation control is more challenging for patients with these conditions. Novel agents offering a predictable dose-response may benefit these patients.

PCV9

ASSESSMENT OF RENAL FUNCTION AND IMPAIRMENT BY GFR IN ATRIAL FIBRILLATION (AFIB) PATIENTS IN THE OUTPATIENT SETTING UTILIZING AN EMR DATABASE

Biskupiak J[1], Goodman M[2], Wu D[3], Mansoor G[4], Dahal A[1]
[1]*University of Utah, Salt Lake City, UT, USA,* [2]*University of Utah College of Pharmacy, Salt Lake City, UT, USA,* [3]*Merck & Co, Inc., Whitehouse Station, NJ, USA,* [4]*Merck & Co, Inc., Rahway, NJ, USA*

OBJECTIVES: Patients with Afib have higher risk of stroke than those without Afib. Anticoagulant therapy prevents strokes in Afib, however, Afib patients with moderate to severe renal impairment have been excluded from trials. The objective of this study was to assess the distribution of renal function by estimated glomerular filtration rate (eGFR) in Afib patients. **METHODS:** A retrospective, cohort design study was conducted using an EMR database. The study period was January 1996 thru December 2010 [eligibility period: 1/2006 - 12/2009 for adults diagnosed with Afib (ICD9 code 427.31)]. Index Date was first Afib diagnosis during eligibility period. The pre-index period was Jan 1996 to Index and the post-index period defined as 12 months post Index. Serum creatinine measurement at Index was required. Renal function categorized by NKF Guidelines for Stage of CKD and eGFR calculated using Cockcroft-Gault Equation. Demographic and clinical characteristics were collected, baseline and follow-up renal function determined and logistic regression conducted to assess predictors of renal function decline. **RESULTS:** A total of 61,840 Afib patients (mean age 69.8 years; 54.2% male) identified and categorized by CKD stage (mean age; % male) at Index: Normal – 6,572 (58.5; 73.0%); Stage 1 – 10,901 (62.8; 68.6%); Stage 2 – 20,331 (71.3; 58.6%); Stage 3 – 21,105 (74.9; 39.5%); Stage 4 – 2,579 (75.1; 31.1%); Stage 5 – 352 (71.8; 48.9%). Post-index patients were categorized by CKD stage: Normal – 11,788; Stage 1 – 2799; Stage 2 – 17,009; Stage 3 – 18,849; Stage 4 – 2675; Stage 5 – 401 (8,319 patients with no post-index eGFR). Male gender and increasing age and Charlson Comorbidity Index were predictors of renal function decline (>10%) as well as CHD, CKD, DM, HF, HTN and proteinuria (p<0.05). **CONCLUSIONS:** Nearly 40% of Afib patients in this study exhibited moderate to severe renal impairment.

PCV10

ARE THE STATINS EFFECTIVE TO PREVENT FIRST MYOCARDIAL INFARCTION IN REAL LIFE?

Grimaldi L[1], Rossignol M[2], Danchin N[3], Dallongeville J[4], Bruckert E[5], Khachatryan A[6], Benichou J[7], Abenhaim L[6]
[1]*LA-SER Europe Limited, Paris, France,* [2]*LA-SER CRR- International, Montreal, Quebec, Canada,* [3]*Hôpital Européen Georges Pompidou, Paris, France,* [4]*Institut Pasteur de Lille, Lille, France,* [5]*Hôpital de la Pitié-Salpêtrière, Paris, Cedex 13, France,* [6]*LA-SER Europe Limited, London, UK,* [7]*Inserm, Rouen, Rouen, France*

OBJECTIVES: To assess the impact of real life statin utilization on the risk of first non-fatal myocardial infarction (MI). **METHODS:** Design: Case-control methodology using the pharmacoepidemiological information system "PGRx". Data on comorbidities, risk factors and medications were obtained from medical records and patient telephone interviews. Setting: General practices (n=371) and cardiology centres (n=60) across France. Participants: Cases were patients with the first MI ≤ 1 month before the date of recruitment (n=2238). Controls were patients seen by a general practitioner (GP) with no restriction as to the reasons of consultation (n=2238), matched to MI cases on gender, age, frequency of visits to a doctor, date of recruitment and personal history of non-cardiovascular chronic disease. Exposure: Statin exposure was defined as any utilisation in the two-year prior to date of MI in cases or recruitment date in controls. Main outcome measures: Adjusted odds ratios (OR) of the risk of first MI was estimated by multiple conditional logistic regression models. Comparative effectiveness and propensity to use of individual statin molecules were assessed. **RESULTS:** The use of statins was associated with a lower MI risk, with adjusted OR 0.67 [95% CI 0.56 - 0.79] for current use (within 2 months before the index date) and 0.73 [0.62 –0.86] for any use within 24 months. Among individual statins, rosuvastatin was associated with the lowest MI risk (adjusted OR 0.49 [0.35 - 0.68] for any use in 24 months preceding the index date) followed by simvastatin (0.62 [0.46 - 0.84]) and others. **CONCLUSIONS:** This is the first major population-based field study to investigate the effect of statins on the risk of first non-fatal MI in a real life situation. We observed similar risk reduction as in recent meta-analyses. While most individual statin molecules displayed protective effect, their effectiveness varied depending on patient profile and treatment patterns.

PCV11

PATIENT CHARACTERISTICS AND COMORBIDITIES OF PATIENTS WITH ATRIAL FIBRILLATION IN JAPAN

Briere JB[1], Rossi B[2], Iwamoto K[2], Stankus A[3], Dibonaventura MD[4]
[1]*Bayer Yakuhin, Ltd., Chiyoda-ku, Tokyo, Japan,* [2]*Bayer Yakuhin, Ltd., Kita-ku, Osaka, Japan,* [3]*Kantar Health, Princeton, NJ, USA,* [4]*Kantar Health, New York, NY, USA*

OBJECTIVES: Although studies have investigated the epidemiology of patients with atrial fibrillation (AF), research in Japan is lacking. The aim of the current study was to assess the patient characteristics, medication use, and comorbidities of an AF sample from a representative data source in Japan to make broad cross-region comparisons. **METHODS:** The 2008, 2009, and 2010 Japan National Health and Wellness Survey (NHWS) datasets were used in this study. The NHWS is an Internet-based survey administered to the adult population in Japan using a random stratified sampling framework to ensure demographic representativeness. Only patients who reported a diagnosis of AF (N=565) in these datasets were included in the analyses. Demographics, health characteristics, stroke risk (using the CHA_2DS_2-VASc score), and comorbidities were all assessed. **RESULTS:** Most patients were male (83.5%), 60 years or older (77.0%), weighed 64.50 kilograms (SD=11.04), and had been diagnosed for 10.4 years (standard deviation=10.6). Nearly a fifth (19.1%) continued to smoke. Based on the CHA_2DS_2-VASc score, 11.5% patients were of low stroke risk, while 35.4% and 53.1% were of moderate and high risk, respectively. Despite this risk for stroke, only 64.2% of patients were currently being treated for AF. Patients with AF also reported a number of comorbidities including 87.1% with another cardiovascular condition, 67.8% with a urological condition, 37.3% with dyspepsia, and 32.7% with pain. A total of 8.0% of patients reported a previous myocardial infarction. **CONCLUSIONS:** The AF population in Japan is somewhat unique in its dramatic gender split and lower body weight. Additionally, most AF patients in Japan, through a combination of their behaviors (e.g., smoking) and health characteristics, are at moderate-to-high risk for a future stroke. Despite this risk, not all patients are being treated according to current guidelines. Further, these patients suffer from a number of comorbidities which can complicate treatment decisions.

PCV12

IMPACT OF COMORBIDITIES ON HEART FAILURE HOSPITALIZATION RISK: A CONTEMPORARY MEDICAID COHORT ANALYSIS

Shaya FT[1], Breunig IM[1], Mehra MR[2]
[1]*University of Maryland School of Pharmacy, Baltimore, MD, USA,* [2]*Harvard Medical School, Boston, MA, USA*

OBJECTIVES: Heart failure (HF) accounts for an excess hospitalization burden in the United States, and consumption of health care costs. An aging population, economic pressures with loss of regular insurance, and increasing co-morbidity beckon a contemporary analysis of outcomes within a nested Medicaid population. **METHODS:** Medical/prescription/enrollment records from the Maryland State Medicaid Managed Care Organization/Fee-for-service populations were used to follow 18-64 year olds with a diagnosis of HF between 7-1-05 and 6-30-10 for > 6 months. Cox-proportional hazard models assessed the impact of COPD, CVD, stroke, and renal dysfunction on hospitalization risk post-HF, adjusting for demographics, disease modifying therapies for HF (ACE inhibitors, ARB, β-Blockers, aldosterone antagonists, other CV drugs), and whether diagnosis coincided with first hospitalization. **RESULTS:** Of 13,192 HF patients, 71% were 45-64 years old, 44% men, 60% African-American, 26% with first HF diagnosis at first hospitalization. Patients with renal dysfunction were more likely (HR=1.12, p<0.001) while patients with COPD (HR=0.85, p<0.001) or stroke (HR=0.64, p<0.001) less likely to be hospitalized for HF. There was a lower hospitalization risk among patients who received ACE inhibitors (HR=0.72, p<0.001), ARB (HR=0.75, p<0.001), β-Blockers (HR=0.81, p<0.001), or other CV medications (HR=0.75, p<0.001). Patients diagnosed with HF at first hospitalization were 2.33 times more likely to be re-hospitalized (p<.001) and risk also increased with age. African-Americans were more likely, than Caucasians (HR=1.28, p<0.001), other races less likely (HR=0.60, p=0.004), and men (HR=1.13) more likely to be hospitalized. **CONCLUSIONS:** Renal dysfunction concurrent with HF increased the likelihood of hospitalization, as did age, male gender and African-American race. Understandably, HF patients on disease-modifying therapies, but surprisingly those also diagnosed with COPD or stroke, were less likely to be hospitalized. These findings deserve consideration as disease management systems are developed in an era of health care transformation.

PCV13

COMPARISON OF CARDIAC VOLUME MEASUREMENTS USING THREE-DIMENSIONAL AND CONVENTIONAL ECHOCARDIOGRAPHY IN DOGS

Poulsen Nautrup B[1], Penzl S[2], Poulsen Nautrup C[2]
[1]*EAH Consulting, Juelich, Germany,* [2]*Ludwig-Maximilians-University Munich, Munich, Germany*

OBJECTIVES: Volume measurements of the left ventricle are essential part of echocardiographic diagnosis of canine heart diseases. Three-dimensional echocardiography (3DE) has been rarely used in veterinary medicine mainly due to economic limitations. A new technique now allows a fast semi-automatic direct measurement with 3DE, additionally to the calculation of volumes according to reported formulas, as used previously. This new method has proven in human medicine to reveal comparable results to those obtained from the gold standard MRI. MRI is not indicated in dogs suffering from heart failure, because of the necessity of general anesthesia. The aim of this study was to compare results from conventional methods of echocardiography with 3DE. **METHODS:** End-diastolic and end-systolic standard measurements of the left ventricle were performed in 42 healthy dogs (beagles and dachshunds), including calculation of volume according to Teichholz measurements using M-Mode, calculations of volume using single plane and biplane method of discs (Simpson's rule) with two-dimensional echocardiography